Claims

I claim:

1. A dual-lumen, reverse-flow catheter comprising an arterial lumen having an inner surface, an outer surface, a distal end, and a proximal end; and a venous lumen having an inner surface, an outer surface, a distal end, and a proximal end, wherein the distal end of the arterial lumen extends beyond the distal end of the venous lumen, wherein the distal end of the arterial lumen comprises one aperture and the distal end of the venous lumen comprises at least one aperture.

2. The catheter of claim 1, wherein the arterial lumen is disposed within the venous lumen in a co-axial configuration.

3. The catheter of claim 2, wherein the distal end of the arterial lumen extends between 5-10 cm beyond the distal end of the venous lumen.

4. The catheter of claim 3, wherein the distal end of the arterial lumen extends between 6-8 cm beyond the distal end of the venous lumen.

5. The catheter of claim 4, wherein the distal end of the arterial lumen extends 7 cm beyond the distal end of the venous lumen.

6. The catheter of claim 2, wherein the distal end of the venous lumen is tapered.

7. The catheter of claim 2, wherein the distal end of the arterial lumen is tapered.

8. The catheter of claim 2, wherein the distal end of the venous lumen is fused onto the outer surface of the arterial lumen.

9. The catheter of claim 2, wherein at least one elongate ridge that runs substantially along the length of the catheter is attached between the outer surface of the arterial lumen and the inner surface of the venous lumen.

10. The catheter of claim 2, wherein at least one spoke is attached between the outer suface of the arterial lumen and the inner surface of the venous lumen.

11. The catheter of claim 1, wherein the arterial lumen is disposed within the venous lumen in a circle-C configuration.

12. The catheter of claim 11, wherein the distal end of the arterial lumen extends between 5-10 cm beyond the distal end of the venous lumen.

13. The catheter of claim 12, wherein the distal end of the arterial lumen extends between 6-8 cm beyond the distal end of the venous lumen.

14. The catheter of claim 13, wherein the distal end of the arterial lumen extends 7 cm beyond the distal end of the venous lumen.

15. The catheter of claim 11, wherein the distal end of the venous lumen is tapered.

16. The catheter of claim 11, wherein the distal end of the arterial lumen is tapered.

17. The catheter of claim 11, wherein the distal end of the venous lumen is fused onto the outer surface of the arterial lumen.

18. The catheter of claim 11, wherein at least one elongate ridge that runs substantially along the length of the catheter is attached between the outer surface of the arterial lumen and the inner surface of the venous lumen.

19. The catheter of claim 11, wherein at least one spoke is attached between the outer suface of the arterial lumen and the inner surface of the venous lumen.

20. The catheter of claim 1, wherein the arterial lumen and the venous lumen are positioned in a double-D configuration.

21. The catheter of claim 20, wherein the distal end of the arterial lumen extends between 5-10 cm beyond the distal end of the venous lumen.

22. The catheter of claim 21, wherein the distal end of the arterial lumen extends between 6-8 cm beyond the distal end of the venous lumen.

23. The catheter of claim 22, wherein the distal end of the arterial lumen extends 7 cm beyond the distal end of the venous lumen.

24. The catheter of claim 1, wherein the distal end of the venous lumen comprises a plurality of apertures.

25. The catheter of claim 24, wherein the apertures have a cross-sectional shape selected from the group consisting of circular, oval, or slits.

26. The catheter of claim 1, wherein the catheter includes an agent selected from the group consisting of: antifibrin agents, antithrombin agents, anticoagulant agents, and antimicrobial agents.

27. The catheter of claim 1, wherein the catheter is made from a substance selected from the group consisting of: thermoplastics, high performance engineering resins, polyethylene (PE), polypropylene (PP), polyvinylchloride (PVC), polyurethane, polytetrafluoroethylene (PTFE), polyether-ether ketone (PEEK), polyimide, polyamide,

polyphenylene sulfide (PPS), polyphenylene oxide (PPO), polysufone, nylon, perfluoro(propyl vinyl ether) (PFA), and silicone.

28. The catheter of claim 27, wherein additional substances for reducing kinking are included in making the catheter, wherein said additional substance is selected from the group consisting of: metals, stainless steel, nickel alloys, nickel-titanium alloys, or other alloys.

29. The catheter of claim 1, further comprising a hollow hub to which the catheter is connected, wherein the venous lumen is separable from the arterial lumen.

30. The catheter of claim 1, wherein the catheter is inserted into a patient having a right atrium and vena cava, wherein after insertion, the arterial lumen is positioned in the right atrium and the venous lumen is positioned in the vena cava.

31. A method for treating blood, said method comprising the steps of:

a) making an incision to a blood vessel; and

b) inserting into the blood vessel, in the direction of blood flow, a dual-lumen, reverse-flow catheter comprising an arterial lumen having an inner surface, an outer surface, a distal end, and a proximal end; and a venous lumen having an inner surface, an outer surface, a distal end, and a proximal end, wherein the distal end of the arterial lumen extends beyond the distal end of the venous lumen, wherein the distal end of the arterial lumen comprises one aperture and the distal end of the venous lumen comprises at least one aperture, wherein blood from the blood vessel is drawn through the aperture at the distal end of the arterial lumen;

c) treating the drawn blood; and

d) returning the treated blood to the blood vessel through the at least one aperture at the distal end of the venous lumen.

32. The method of claim 31, further comprising the step of placing the catheter such that the arterial lumen is situated in a right atrium and the venous lumen is situated in a superior vena cava.

33. The method of claim 31, further comprising the step of inserting a guide wire into the incision and feeding the distal end of the arterial lumen into the incision over the guide wire into the blood vessel.

34. The method of claim 31, wherein the catheter includes a removable, hollow hub to which the catheter is connected and the venous lumen is separable from the arterial lumen, further comprising the steps of removing the catheter from the blood vessel and replacing the arterial lumen with a new arterial lumen.

35. The method of claim 31, wherein the blood vessel is selected from the group consisting of jugular vein, suclavian vein, hepatic vein, femoral vein, and inferior vena cava.